

CLAIMS

What is claimed is:

1. A process for converting natural gas to liquid hydrocarbon products comprising:

converting said natural gas to a syngas having a composition of carbon monoxide, carbon dioxide, hydrogen, and
5 water;

adjusting said composition of said syngas to form an adjusted syngas by:

removing at least a portion of said carbon dioxide from said syngas; and

10 removing at least a portion of said hydrogen from said syngas; and

converting said adjusted syngas to said liquid hydrocarbon products.

2. The process of claim 1 wherein the hydrogen to carbon dioxide in said syngas is adjusted to a ratio of 2.

3. The process of claim 1 wherein said natural gas is converted to said syngas by steam reforming and/or auto thermal reforming.

4. The process of claim 1 wherein said adjusted syngas is converted to said liquid hydrocarbon products by a Fischer-Tropsch process.

5. The process of claim 3 wherein said adjusted syngas is converted to said liquid hydrocarbon products by a Fischer-Tropsch process.

6. The process of claim 5 including:

mixing at least a portion of said removed carbon dioxide into said natural gas before said natural gas is converted to said syngas.

7. The process of claim 5 including:

using a portion of said removed hydrogen as fuel in carrying out said steam reforming.

8. The process of claim 1 including:

upgrading said liquid hydrocarbon products by passing said liquid hydrocarbon products through a distillation column to form separate hydrocarbon products.

9. The process of claim 1 including:

removing substantially all of any sulfur in said natural gas before said natural gas is converted to said syngas.

10. A system for converting natural gas into liquid petroleum products, the system comprising:

a syngas synthesis subsystem for converting natural gas to a syngas which, in turn, comprises carbon monoxide, carbon dioxide, hydrogen, and water;

a syngas adjusting subsystem for removing carbon dioxide and hydrogen from said syngas to produce an adjusted syngas; and

a product synthesis subsystem for converting said adjusted syngas into said liquid hydrocarbon products.

11. The system of claim 10 wherein said syngas synthesis and compression subsystem comprises:

a steam reformer for converting said natural gas to said syngas.

12. The system of claim 11 wherein said product synthesis subsystem comprises;

at least one Fischer-Tropsch reactor.

13. The system of claim 10 wherein said syngas adjusting subsystem comprises:

a means for removing said carbon dioxide from said syngas; and

5 a means for removing hydrogen from said syngas.

14. The system of claim 13 including:

means for mixing at least some of said removed carbon dioxide into said natural gas before said natural gas enters said steam reformer.

15. The system of claim 10 including:

a liquid hydrocarbon products upgrading subsystem comprising:

a distillation column.

16. The system of claim 10 wherein said syngas synthesis subsystem and said product synthesis subsystem are comprised of previously used components from the syngas synthesis subsystem and the product synthesis subsystem of a plant which

5 was previously used to convert natural gas to methanol.

17. The method for modifying a natural gas-to-methanol conversion system having a syngas synthesis subsystem and a product synthesis subsystem to a natural gas-to-liquid hydrocarbon products system, said method comprising:

5 installing a syngas adjusting subsystem to receive syngas from said syngas synthesis subsystem and remove carbon dioxide and hydrogen from said syngas to produce an adjusted syngas; and

10 changing the catalyst in said product synthesis subsystem from a catalyst which converts syngas to methanol to a catalyst which converts said adjusted syngas to said liquid hydrocarbon products.

18. The method of claim 17 including:

installing a line for flowing carbon dioxide from said syngas adjusting subsystem to said syngas synthesis subsystem for mixing with said natural gas.

19. The method of claim 18 including:

a product upgrading subsystem adapted to receive said liquid hydrocarbon products from said product synthesis subsystem.

20. The method of claim 19 including:

means for returning said removed hydrogen to said syngas synthesis subsystem for use as fuel and to said product upgrading subsystem for use in upgrading said liquid hydrocarbons.